3M Technical Information

Product Information
3M™ Driver Feedback Sign DFS 700 Model

3M™ Driver Feedback Signs (DFS) are known as effective speed calming tools for traffic authorities. With the new DFS 700 model 3M offers state-of-the-art three-color LED display technology for informing drivers about their vehicle's speed and reminding them of the given speed limit.

Vehicle speeds that are measured by the integral microwave radar are displayed and logged for analysing the speed reduction in order to confirm the effectiveness of the DFS.

Driver feedback signs are used on road sections where compliance with the posted speed limit is essential for traffic safety and quality of life. Example locations are:

Speed Transitions

- Residential areas
- Areas with speed limits
- Work zones
- City entrances

Accident Sites

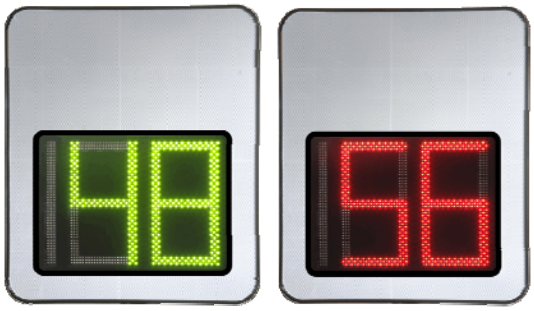
- Dangerous curves
- Bridges
- Tunnels

Vulnerable Road User Congregations

- Hospitals
- School zones
- Near old people's homes
- Factory premises
- University grounds

Locations with Environmental Issues

- Noisy roads
- Polluted areas



Product Features

Various Operating Modes
Buy much more than a speed feedback display

a. Radar Mode for real-time speed information

b. Limit Mode for displaying speed limit only

c. Covert Mode for measuring speed without feedback (useful for effectiveness studies)

d. Demo Mode for demo and inspection of display color, brightness, and flashing

Three-colour LED Display
Display a clearer message to drivers

a. Intuitive colors: green for within speed limit, amber for caution and red for warning – exceeding the speed limit

b. Flashing display for additional warning

c. 2 ½ digits for speeds up to 199 and readable from 100 m and more (for optimal conditions)

d. 13-segment digits for better readability as compared to common 7-segment digits

e. Brightness adaptation to ambient light for better readability

Display Range Setting
Define the speed range to react to

a. Limit the highest shown speed to prevent misuse like intentional speeding

b. Limit the lowest shown speed to avoid the detection of pedestrians or bicycles

High Visibility
Catch driver attention anytime

a. Increased sign visibility at night due to 3M Diamond Grade reflective sheeting

b. Combinable with DG coated backboard for additional static messages

Various Power Options
Provide power to DFS anywhere

a. Operate with line power using power supply unit, e.g. for fixed installations

b. Operate with one or two optional 17Ah batteries for mobile applications

c. Operate with battery buffered line power using optional charger in locations with temporary only line power (e.g. street lamp)

Various Communication Options
Communicate with DFS from any distance

a. USB cable for local data link to PC

b. Bluetooth for wireless link to PC or PDA

c. Optional GSM for long distance wireless data connection from your office (requires data SIM card from local GSM provider)

Various Installation Options
Install DFS as you need

a. Use DFS unit stand alone for fixed installations and connected to line power

b. Use optional mounting box for mobile installations and to protect accessories

c. Detach display from frame for integration in customized static sign board or cabinet

SMS Notification (with optional GSM)
Let the DFS tell you when it needs attention

a. SMS on low (battery) voltage

b. SMS when memory almost full or full and old data about to be overwritten

c. SMS when diagnostic check identifies defect

Diagnostic Functions
Easily verify proper operability of your DFS

a. Diagnostic check verifies data memory integrity, supply voltage, radar operation, GSM communication, Bluetooth comm. etc.

b. Self diagnostic check is executed at startup, at midnight or on user demand

c. Status codes indicate component status

Speed Data Analysis
Download and analyse speed data with software

a. Measure traffic volume and speed at a location

b. Create overview tables and several graphical charts with just a few mouse clicks

c. Create before & after studies to determine speed reduction effectiveness of DFS

d. Identify periodically speeding individuals

Weekday Scheduling
Define on/off time schedules per weekday

a. Prevent habituation of drivers and increase credibility by activating the DFS only when needed, e.g. at school time in front of school

b. Save power to increase battery time and increase LED life-time

User Friendly Design
Save cost and time for installation and use

a. Lightweight design (DFS only 8,5 kg) for transport and mounting by one person

b. Software user interface design for highest user friendliness

c. Optional battery & mounting box for a professional installation to different post diameters (60 – 140 mm)

d. Safe and secure storage of accessories in optional battery & mounting box

High Quality Standard
Trust in highest reliability

a. Closed design ensures protection against humidity and dust

b. Self diagnostic functions allow quick verification of operability

c. SMS notification function informs you about service needs (with GSM option)

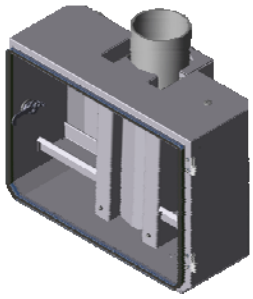
Included Components

The DFS 700 main unit is delivered as plug-and-play device including all needed components to directly operate and install it. Only the tools and qualified people for mounting, connecting with the corresponding power supply and commissioning the device have to be provided. The package of the main unit contains the following parts:

- CD with PC and PDA software and DFS 700 installation and user manual. Also a USB cable and a Bluetooth stick for PC USB port

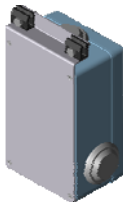
One power supply has to be chosen from the optional accessories!

- Lockable battery & mounting box for storing accessories and mounting the DFS to poles of 60 to 140 mm diameter



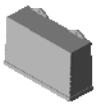
Optional Accessories

Different optional accessories can be purchased separately according to the specific needs of the customer and the application.

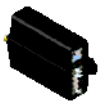


- Power supply unit for converting 230 Volt AC line power to 12 Volt DC for DFS 700

- 17 Ah lead-gel battery with cable and polarity protected connector. Up to two such batteries can be connected to a DFS 700



- Battery charger for charging the battery either directly or through the DFS



- GSM/GPRS modem for long distance comm. over 900 and 1800 MHz GSM networks

Technical Data

Dimensions & Weight
660 x 770 x 110 mm (w x h x d), 8,5 kg

Operating Voltage
11,3 V – 15,0 V

Current (Power)
Standby 0,02 A (0,24W)
Radar mode w/o traffic (display inactive)
0,08 A (0,96 W)
Radar mode with traffic (display active, one color @med brightness) 1,00 A (12 W)
Peak current (less than 1 second with all components on)
5 A (60 W)

Power Supply Unit*
Input 100 V – 240 V AC @ 50 – 60 Hz
Protection class 1
Output 12 V / 100 W
IP 55, ca. 2 kg

Battery Standby Time
Approx. 850 hours using one completely charged 17 Ah battery

Fuse
ATO Fuse 4A T

Cabinet Rating
IP 54

Cabinet Color

7042 RAL

Sign Face
White Diamond Grade™ reflective sheeting
Printable area 530 x 290 mm (w x h)

Temperature Range
–35 to + 75 °C (DFS 700 internal temp.)

Humidity Range
Up to 95 %

Display
330 mm high, 450 mm wide
2 ½-digits (speed up to 199), 13 segments

LEDs
InGaAlP SMD LEDs, viewing angle 16 – 18°
3 rows green (570 nm), 3 rows red (635 nm)

Backup Battery
Lithium 3V CR2450, ca. 2 years lifetime

Data Memory
1 MB non-volatile flash memory
100.000 data entries

Radar Frequency
24,15 GHz – 24,25 GHz

Radar Power
20 dBm, 100 mW e.i.r.p.

Radar Speed Range and Accuracy
Measures from 3 km/h to 199 km/h (can be limited)
± 2 km/h for speeds below 100 km/h
± 2 % for speeds above 100 km/h

Radar Detection Range
Approximately 100m for avg. 4-seat sedan

Radar Beam Width
14° horizontal, 24° vertical

Bluetooth
Class 2 module, 4dBm transmission power, up to 20 m range

Interfaces
USB, Bluetooth, Charger input, Battery 1 input (charged when charger connected), Battery 2 input, Power switch, RS-232 (for GSM Modem), GSM power supply, Switchgear for ext. devices, Grounding bolt

Switchgear
24 VAC / DC, 150 mA, connector type Weidmüller BLZF 3.5/3/F SNOR

Firmware
Flashable

Software
DFS-CAS for Windows 2000/XP PC
DFS-CAS for Windows Mobile 5.0 PDA

GSM Modem*
Wavecom 900 MHz / 1800 MHz
(requires SIM card with Circuit Switched Data Services from local GSM provider), ca. 0,25 kg

Batteries*
12 V, 17 Ah, ca. 6kg

Battery Charger*
100 V – 240 V AC @ 50 – 60 Hz
Protection class 2
Max output 12 V / 60 W
Temperature range - 40° to +40°
IP 67, ca. 1kg

Battery & Mounting Box*
For 60 to 140 mm pole diameters, ca. 7,5 kg

* optionally available accessories

DFS 700 EU Standards Compliance

Device	Standard (Directive / Council Recommendation)
DFS 700	EN 50293 (89/336/EEC EMC Directive) Electromagnetic compatibility - Road traffic signal systems - Product standard
DFS 700	EN 300 440-2 (99/5/EC R&TTE Directive) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2:Harmonized EN under article 3.2 of the R&TTE Directive
DFS 700	EN 60950 / EN 60215 (73/23/EEC Low Voltage Directive) Safety of information technology equipment including electrical business equipment / Safety requirements for radio transmitting equipment
DFS 700 Radar Unit	EN 301 489-3 (99/5/EC R&TTE Directive) Electromagnetic compatibility and Radio spectrum Matters (ERM): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz EN 50392 (99/519/EC EMF Recommendation) Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz - 300 GHz)
DFS Bluetooth Module	EN 301 489-17 (99/5/EC R&TTE Directive) Electromagnetic compatibility and Radio spectrum Matters (ERM): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment EN 300 328 (99/5/EC R&TTE Directive) Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques; Harmonized EN covering essential requirements under article 3.2 of R&TTE Directive EN 50392 (99/519/EC EMF Recommendation) Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz - 300 GHz)
DFS 700 GSM Modem*	EN 301 489-7 (99/5/EC R&TTE Directive) Electromagnetic compatibility and Radio spectrum Matters (ERM): ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS) EN 301 511 (99/5/EC R&TTE Directive) Global System for Mobile communications (GSM); Harmonized standard for mobile stations in the GSM 900 and DCS 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC) EN 50392 (99/519/EC EMF Recommendation) Generic standard to demonstrate the compliance of electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (0 Hz - 300 GHz)

99/5/EC R&TTE Directive
Directive of 9 March 1999 of the European Parliament and of the Council on Radio Equipment and Telecommunications Terminal Equipment and the mutual recognition of their conformity

89/336/EEC EMC Directive
Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility

73/23/EEC Low Voltage Directive
Council Directive of 19 February 1973 on the harmonisation of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits

99/519/EC EMF Recommendation
Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to ElectroMagnetic fields (0 Hz to 300GHz)

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